HP Integrity Computer Systems HP-UX 11i v2 to 11i v3 Network Driver Migration Guide

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About This Document

This manual lists and describes the changes between HP-UX 11i v2 and 11i v3 that affect a network driver migration. It also provides information on how to migrate your network driver from HP-UX 11i v2 to 11i v3.

The document printing date and part number indicate the document's current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number will change when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found on line at:

http://www.hp.com/go/hpux_ddk

NOTE: This book contains many examples of C programs to help design device drivers. Because of page width restrictions, some long lines of code exceed the space available and break in unintended places. Treat these broken lines as one line. We recommend that you use the sample files included with this manual when possible, rather than retyping the examples.

Intended Audience

This document is intended for system administrators or developers responsible for porting or writing drivers. Developers are expected to:

- Have experience writing programs in the C language.
- Have working knowledge of the basic concepts of writing a driver.
- Understand the functionality of the hardware for which the driver is being written.
- Understand the HP-UX System Administration Tasks manual and performed system administration.
- Have working knowledge of the virtual memory, I/O, and file system areas in the HP-UX and/or UNIX operating systems.

This document is not a tutorial.

Publishing History

Table 1 Publishing History Details

Document Manufacturing Part Number	Operating Systems Supported	Supported Product Versions	Publication Date
5187-4493	11i v3	11.31.02	February 2007

Typographical Conventions

This document uses the following conventions.

audit(5) An HP-UX manpage. In this example, *audit* is the name and *5* is the section in the *HP-UX Reference*. On the web and on the Instant Information CD, it may be a hot link to the manpage itself. From the HP-UX command line, you can enter "`man audit`" or "`man 5 audit`" to view the manpage. See *man*(1).

Book Title The title of a book. On the web and on the Instant Information CD, it may be a hot link to the book itself.

KeyCap	The name of a keyboard key. Note that **Return** and **Enter** both refer to the same key.
Emphasis	Text that is emphasized.
Bold	Text that is strongly emphasized.
Bold	The defined use of an important word or phrase.
`ComputerOut`	Text displayed by the computer.
`UserInput`	Commands and other text that you type.
`Command`	A command name or qualified command phrase.
`Variable`	The name of a variable that you may replace in a command or function or information in a display that represents several possible values.
[ ]	The contents are optional in formats and command descriptions. If the contents are a list separated by `|`, you must choose one of the items.
{ }	The contents are required in formats and command descriptions. If the contents are a list separated by `|`, you must choose one of the items.
...	The preceding element may be repeated an arbitrary number of times.
`|`	Separates items in a list of choices.

HP-UX Release Name and Release Identifier

Each HP-UX 11i release has an associated release name and release identifier. The `uname` command with the `-r` option returns the release identifier. This table shows the releases available for HP-UX 11i.

Table 2 HP-UX 11i Releases

Release Identifier	Release Name	Supported Processor Architecture
B.11.31.02	HP-UX 11i v3	PA-RISC and Itanium®

Related Documents

You can find additional information about migration from HP-UX 11i v2 to HP-UX 11i v3 at:

http://www.hp.com/go/hpux_ddk

Other documents in this collection include:

- *DDK FAQ*
- *HP-UX 11i v3 Driver Development Guide*
- *HP-UX 11i v3 Driver Development Reference*
- *HP-UX 11i v3 Driver Development Getting Started Guide*

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Please include document title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document. Also, please include what we did right so we can incorporate it into other documents.

Email & Internet Resources

Interface program and developer resource materials are available at the following locations:

- Interface Program E-mail at:

  interface@fc.hp.com
- Developer Resource at:

  http://devresource.hp.com/

Support and Compatibility Disclaimers

Because drivers function at the level of the kernel, HP reminds you of the following:

- Adding your own driver to HP-UX requires relinking the driver into HP-UX. With each new release you should plan on recompiling your driver in order to reinstall it into the new HP-UX kernel. Many header files do not change. However, drivers typically use some header files that could change across releases (you might have some system dependencies).
- HP provides support services for HP products, including HP-UX. Products, including drivers, from non-HP parties receive no support, other than the support of those parts of a driver that rely on the documented behavior of supported HP products.
- If difficulties arise during the development and test phases of writing a driver, HP may provide assistance in isolating problems to determine if:
  - HP hardware is not at fault; and
  - HP software (firmware) is not at fault by removing user-written kernel drivers.
- When HP hardware, software, and firmware are not at fault, you should seek help from the third party from whom you obtained software or hardware.

1 Overview

The *HP-UX 11i v2 to 11i v3 Network Driver Migration Guide* provides 3rd party developers a resource to understand the HP-UX network stack architecture and network API changes between HP-UX 11i v2 and 11i v3 and an overview for migrating network drivers from HP-UX 11i v2 to 11i v3.

This document describes how to migrate HP-DLPI based LAN drivers and native STREAMS DLPI based LAN drivers.

HP strongly encourages developers to write HP-DLPI based LAN drivers instead of native STREAMS DLPI based LAN drivers because of the many advantages of the HP-DLPI based LAN drivers model. The developers save time by using the HP-DLPI implemention; they do not have to write one of their own. This results in a better time-to-market for their product and reduced maintance costs.

LAN Driver Architecture

HP-UX 11i v3 exports HP-DLPI interfaces for network drivers. A driver written to the HP-DLPI interface is called a non-native HP-DLPI driver (also referred to as a tightly coupled driver). A driver that includes its own implementation of the data link layer written to DLPI standards is called a native STREAMS DLPI driver (also referred to as a loosely coupled driver).

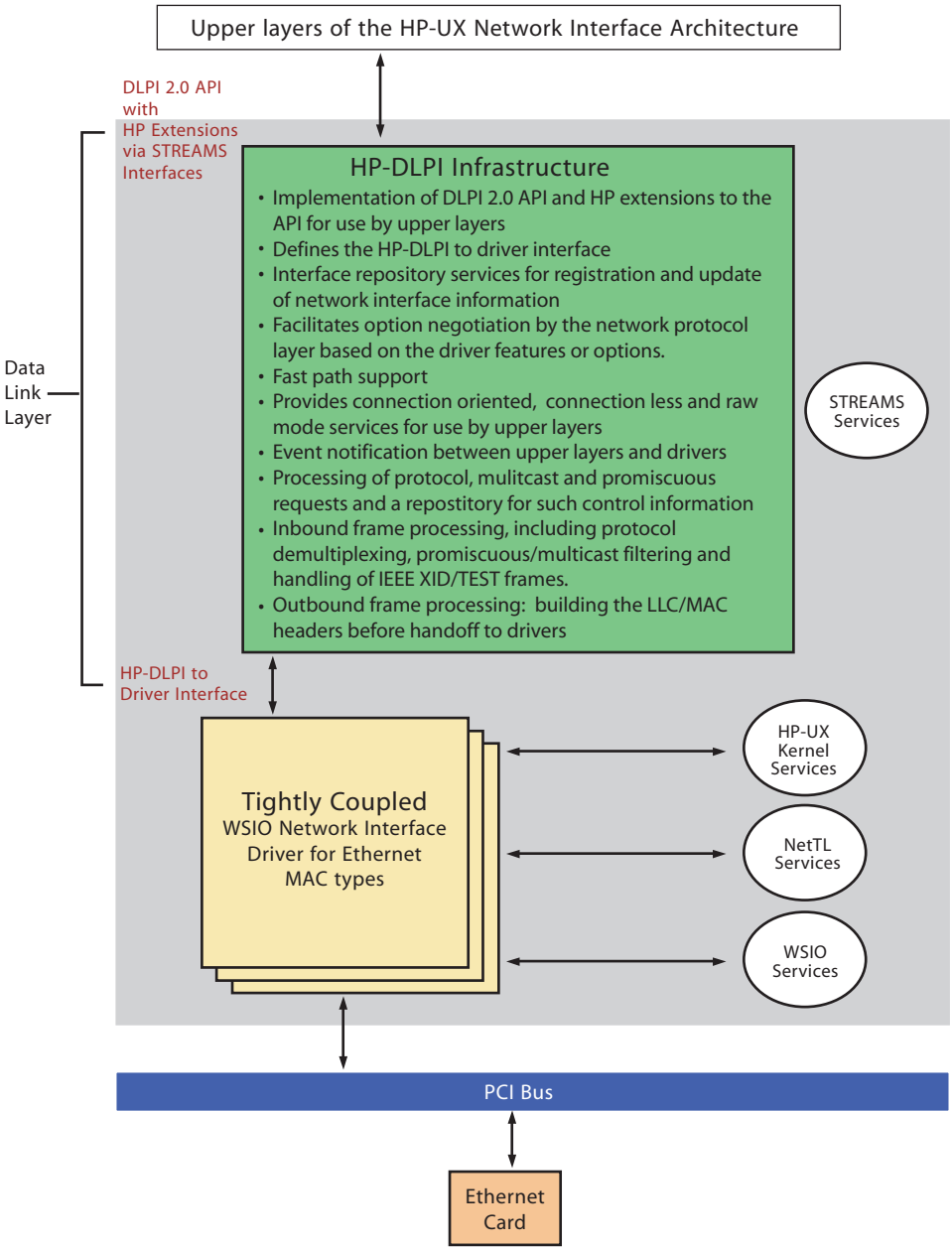
HP-DLPI LAN Driver Architecture

HP-DLPI LAN drivers utilize HP-DLPI for the following operations and features:

- HP-DLPI is the interface between the transport and driver layer. An advantage of writing a non-native driver is that HP-DLPI assumes the responsibility of interacting with the transport layer.
- Support for SMH and LAN commands is provided in the non-native driver architecture.
- HP-DLPI provides support for Out-of-Packet (OOP) and Checksum-offload (CKO).

Figure 1-1 shows the HP-UX 11i v3 HP-DLPI LAN driver architecture.

Figure 1-1 HP-DLPI LAN Driver Architecture



For information on writing an HP-DLPI LAN driver, see the *HP-UX 11i v3 Driver Development Guide*.

Native STREAMS DLPI LAN Driver Architecture

Native STREAMS DLPI LAN drivers are also known as loosely-coupled drivers. Developers can continue to have the option of providing a native DLPI implementation for HP-UX 11i v3. This requires the developer to provide a full DLPI 2.0+HP extensions (for example, `DL_HP_PPA_REQ`) support module.

A native LAN driver must do the following:

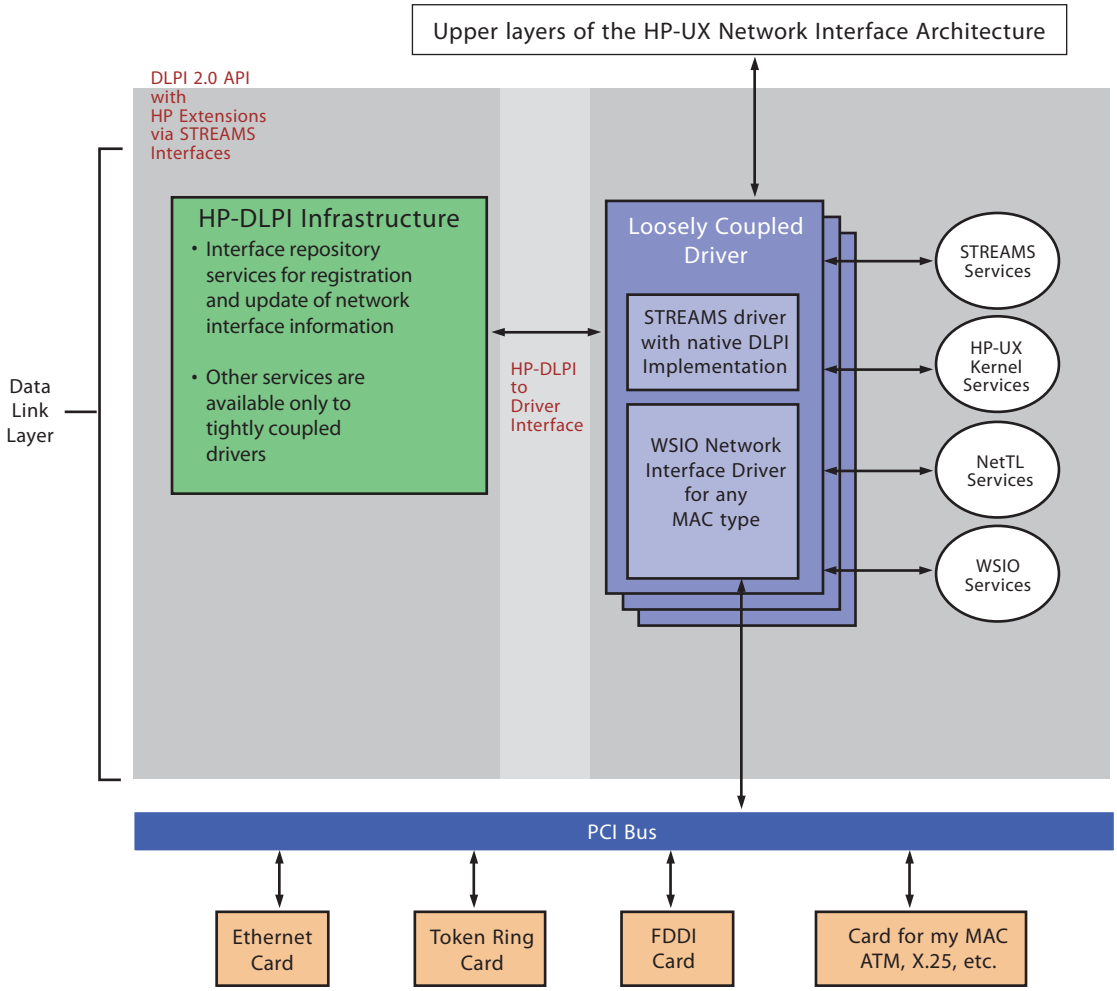
- Register with HP-DLPI during initialization. This is required because on HP-UX the HP-DLPI module also acts as the central repository of all networking interfaces installed on the system. The native STREAMS DLPI driver has its own DLPI implements.
- Inform HP-DLPI every time its hardware state changes.

- Inform HP-DLPI each time the MAC address changes. This is required for LAN commands to display the current MAC address.
- Support specific ioctls, standard DLPI primitives, and specific HP extensions of DLPI primitives. This ensures the driver will work with standard HP-UX LAN commands and SMH.

For information on writing a Native driver, see the *HP-UX 11i v3 Driver Development Guide*. Key native-to-native driver migration issues are noted in the next section of this document.

Figure 1-2 shows the native driver architecture.

Figure 1-2 Native LAN Driver Architecture



2 Native STREAMS DLPI LAN Driver Migration

The `dl_hp_create_info_t` data structure that is used during registration of the driver with HP-DLPI has been extended with the following new fields. These new fields must be set appropriately before registering with HP-DLPI:

- *`dhc_features_one_cap`*
- *`dhc_features_two_cap`*
- *`dhc_features_three_cap`*

To accommodate the new fields in the *`dl_hp_create_info_t`* structure in HP-UX 11i v3, the *`dhc_version`* data field must be set to 3; registration of version 2 drivers will fail.

The `DL_HP_USAGE_INFO_REQ` and `DL_HP_USAGE_INFO_ACK` primitives and data structures associated with them have been modified in 11i v3. The 11i v3 method of implementing this primitive is provided in the ENET sample driver. See the `enet_dlpi_usage_info_req` routine in the ENET sample driver for detailed information on how to modify your driver for 11i v3 to support this primitive.

NOTE: The `DL_HP_USAGE_INFO_REQ` and `DL_HP_USAGE_INFO_ACK` primitives are HP extension to the DLPI standard. The definitions and structures associated with these primitives are likely to undergo modifications in immediate future releases to HP-UX 11i v3. Use this information in your network interface driver for HP-UX 11i v3.

New LAN Command

Starting with HP-UX 11i v3, the `nwmgr` command is a new LAN command, replacing the `lanadmin`, `lanscan`, and `linkloop` commands, which have been obsoleted.

The `nwmgr` command supports driver-specific shared libraries. In addition, it comes with a common services shared library that provides most of the services required by a driver specific shared library. For information on how to develop a driver-specific shared library for your networking driver, see the "LAN Commands" chapter in the *HP-UX 11i v3 Driver Development Guide*.

A fully functional `nwmgr` driver-specific shared library for a Native STREAMS DLPI driver is provided as part of the ENET sample driver under the `misc/netmgr` directory in the ENET driver sources. HP recommends that you use this shared library as a starting point instead of writing one from scratch.

New Graphical User Interface

Starting with HP-UX 11i v3, a new Graphical User Interface (GUI) has been introduced to discover and configure network interface cards. It is part of the new HP System Management Homepage (SMH) web-based GUI and replaces the legacy SAM GUI, which have been obsoleted in 11i v3.

The SMH NIC Tool supports driver-specific shared libraries to enable IHVs to provide driver-specific extensions. For information on how to develop a driver-specific shared library for your networking driver, see the "Supporting the HP SMH NIC Tool in LAN Drivers" chapter in the *HP-UX 11i v3 Driver Development Guide*. In addition, a fully functional SMH NIC Tool driver specific shared library for a Native STREAMS DLPI driver is provided as part of the ENET sample driver under the `misc/ncweb` directory in the ENET driver sources. HP recommends that you use this shared library as a starting point instead of writing one from scratch.

Options Negotiations

HP -DLPI provides a set of ioctls for the in-kernel STREAMS DLS user (for example, IP) to negotiate with the driver and setup a fastpath. These ioctls are specific to HP-UX. Since they

were introduced in HP-UX 11.00, the semantics of the ioctls has not changed. However, the information provided to the DLS user has changed. The interface was originally intended for IP only, but it is DLS-user independent in HP-UX 11i v3.

NOTE: Information on how options negotiations are done between a transport layer entity and HP-DLPI is described in the "Understanding OOP and Transport IOCTLs" chapter in the *HP-UX 11i v3 Driver Development Guide*. A native driver will act like HP-DLPI when it conducts option negotiation with a transport layer entity.

3 Non-Native HP-DLPI LAN Driver Migration

A non-native Networking driver relies on the HP-DLPI layer to interface with the transport layer. A driver has to conform to the DLPI/driver interface specifications. Descriptions of how to write a non-native driver are provided in the "Writing a LAN Driver Under HP-DLPI" chapter in the *HP-UX 11i v3 Driver Development Guide* . For information on the HP-DLPI interfaces, see the HP-DLPI manpages in the *HP-UX 11i v3 Driver Development Reference*.

The `dl_hp_create_info_t` data structure that is used during registration of the driver with HP-DLPI has been extended with the following new fields. These new fields must be set appropriately before registering with HP-DLPI:

- *`dhc_features_one_cap`*
- *`dhc_features_two_cap`*
- *`dhc_features_three_cap`*

The *`dhc_version`* data field must be set to 3 in 11i v3. Starting with 11i v3, registration of version 2 drivers will fail.

Starting with HP-UX 11i v3, non-native DLPI LAN drivers can set the following new features bits in the *`dhc_features_one`* field if the relevant functionality is supported in the driver:

- `DL_HP_DRV_USAGE_INFO`
- `DL_HP_DRV_SUPP_CRA`

The HP-DLPI event entry point now supports a new event, `DL_HP_EVENT_OLD`. Drivers that support online deletion can now use this event to ensure that all outbound data path and control requests from DLPI to the driver are quiesced prior to the deletion of a driver instance. Non-native HP-DLPI based drivers must ensure that the cause information that is passed on `DL_HP_EVENT_LINK_DOWN` is correct as this information could be retrieved and used by `nwmgr`, the SMH NIC Tool GUI, and Critical Resource Analysis (CRA) tools.

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